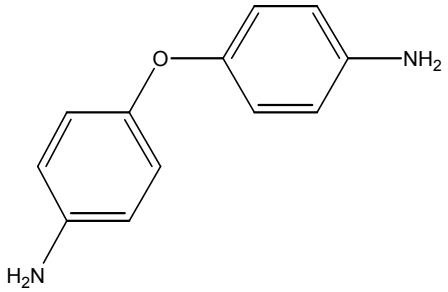
4,4′-OXYDIANILINE
CAS No. 101-80-4
First Listed in the *Fifth Annual Report on Carcinogens*



CARCINOGENICITY

4,4′-Oxydianiline is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC V.16, 1978; NCI 205, 1980; IARC V.29, 1982). When administered in the diet, 4,4′-oxydianiline increased the incidence of adenomas of the Harderian gland and hepatocellular adenomas or carcinomas in mice of both sexes and follicular cell adenomas in female mice and hepatocellular carcinomas or neoplastic nodules and follicular cell adenomas or carcinomas of the thyroid in rats of both sexes. When administered by subcutaneous injection, the compound induced malignant liver cell tumors in rats.

There are no data available to evaluate the carcinogenicity of 4,4′-oxydianiline in humans (IARC V.29, 1982; IARC S.7, 1987).

PROPERTIES

4,4′-Oxydianiline is a nonflammable, colorless, odorless, crystalline aromatic diamine that is insoluble in water, benzene, carbon tetrachloride, and ethanol but is soluble in acetone. It is sensitive to prolonged exposure to air and light. It is incompatible with oxidizers. When heated to decomposition, it emits toxic fumes of nitrogen oxides (NO_x).

USE

4,4′-Oxydianiline is used primarily in the production of polyimide and poly(ester)imide resins (NCI 205, 1980). These resins are used in the manufacture of temperature-resistant products such as wire enamels, coatings, film, adhesives, insulating varnishes, coated fabrics, flame-retardant fibers, oil sealants and retainers; insulation for cables and printed circuits; and laminates and composites for aerospace vehicles (Sax, 1987). 4,4′-Oxydianiline is also used as a raw material in the production of poly(amide)imide resins, which are used in the manufacture of heat-resistant wire enamels and coatings (IARC V.29, 1982). The compound is also used as an intermediate in the manufacture of epoxy resins and adhesives, and in the production of aromatic polyether imides (IARC V.29, 1982; Kirk-Othmer V.18, 1982).

PRODUCTION

The USITC reported that one U.S. company produced an undisclosed amount of 4,4′-oxydianiline from 1981 to 1988 (USITC, 1989). Three domestic companies produced an undisclosed amount in 1980 (USITC, 1981). In 1980, the United States imported 48,500 lb of 4,4′-oxydianiline (USITCa, 1981). The 1979 TSCA Inventory listed four manufacturers producing a total of approximately 2,000 lb of 4,4′-oxydianiline in 1977 (TSCA, 1979). This level of production was nearly constant from 1976 to 1978 (SRI, 1982). This is a significant decline from the estimated 100,000 to 1,000,000 lb reported to have been produced in 1974 (NCI 205, 1980). 4,4′-Oxydianiline has been commercially produced in the United States since 1959 (IARC V.29, 1982). No export data were available.

EXPOSURE

No information regarding routes of potential human exposure to 4,4′-oxydianiline appeared to be available. It could be released in waste streams from its production and use in formulating polymides. In atmosphere it is expected to degrade rapidly reacting with photochemically produced hydroxyl radicals. The particluate phase removal proceeds via deposition. In soil it undergoes covalent chemical bonding with humic material, moderat4e leaching is expected in absence of covalent binding (Spectrum 1999). Occupational exposure is most likely to occur during the manufacture of 4,4′-oxydianiline or in its use in production of polyimide-type resins (IARC V.29, 1982). The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 45 workers were potentially exposed to 4,4′-oxydianiline in the workplace (NIOSH, 1976). This estimate was derived only from observations of the use of trade name products known to contain the compound. 4,4′-Oxydianiline was not included in the National Occupational Exposure Survey conducted by NIOSH from 1980 to 1983. The Toxic Chemical Release Inventory (EPA) listed three industrial facilities that produced, processed or otherwise used 4,4′-oxydianiline in 1998 (TRI, 1999). In compliance with the Community Right-to-Know Program, the facilities reported releases of 4,4′-oxydianiline to the environment which were estimated to total 198 lb.

REGULATIONS

EPA regulates 4,4′-oxydianiline under the Superfund Amendments and Reauthorization Act (SARA), subjecting it to reporting requirements. EPA also regulates 4,4′-oxydianiline under the Toxic Substances Control Act (TSCA). The Interagency Testing Committee (ITC) of TSCA selected 4,4′-oxydianiline to be reviewed for consideration for health and environmental effects testing. OSHA regulates the compound under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-115.